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FOREST INSECT PROBLEMS OF THE PACIFIC COAST.

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For years problems of forest entomology were regarded by many as being apart from the pratice of forestry and the property of the scientist. During the past few years this belief has changed and to day these problems are regarded in the same light as planting, fire protection, grazing, etc, all of which are but phases of forestry.

As this is the first time that this subject has been presented at a meeting of this association, it is believed that this paper should touch briefly upon the general situation on the Pacific Coast, rather than emphasize any one problem. I shall confine my remarks to those insects which are in an epidemic status at this time, and which are attacking and killing green healthy trees. Forest tree killing insects can be placed into two groups; barkbeetles and defoliators. Barkbeetles are those small beetles which feed upon that portion of the trunk between the bark and the wood, completely girdling the tree and causing its death. Defoliating insects kill the trees by destroying the needles, or leaves. I shall first mention as briefly as possible the barkbeetle epidemics of the Pacific Coast.

In the year 1913 an outbreak of the Mountain Pine Beetle occured in the lodgepole pine stands on the Clearwater Drainage of the Blackfoot River, Montana. During the past ten years this infestation has spread both north and south along the west side of the Continental Divide. To the

north
the infestation has spread into Canada, and in the south the advance has now reached the headwaters of the Bitterroot River. Though there has perhaps been slight fluctuations from year to year in the annual loss, this outbreak has continued since 1913, and in the south at least is still in a severe epidemic form. It is impossible to even estimate the value of the lodgepole pine and yellow pine which has been killed during the course of this infestation. It is sufficient to say that it runs into hundreds of thousands of dollars and the end is not in sight. If you can visualize many thousands of acres literally red with the foliage of the insect killed trees you can see the destruction which has, and is still being caused, by this epidemic. During the spring of 1924 an attempt was made to check this infestation from getting into the valuable stands of lodgepole pine on the southern Missoula and Deerlodge National Forests. However from data secured from a survey of the region during the past season it was found that the infestation extended much further than had been assumed, and it was recommended that the project be dropped as additional work was not economically feasible. However it is realized that by taking this stand we have practically signed the death warrant of the remaining lodgepole pine stands of Montana.

In 1912 and 1913 a serious outbreak of the Mountain Pine Beetle occured in the white pine stands of northern Idaho which resulted in the destruction of a large percent of the total volume. This epidemic died down in 1915 and 1916, but there is still a normal infestation which destroys from 2/10 to as much as 1/2 of 1 percent of the total volume of the stand

every year. If this annual loss is placed at 3/10 of 1 percent of the total volume, and a stumpage price of $7.00 per M assumed, both figures being very conservative, we have an annual loss of $350.000 per year in north Idaho alone, and with only one tree species.

During the past year or more there has been a marked increase in the insect losses throughout the lodgepole pine stands of central Idsho. These losses are caused by the mountain pine beetle and there is but little doubt but that a serious outbreak of this insect is pending.

Throughout the yellow pine stands of Oregon and California the western pine beetle takes a heavy annual toll. On one area alone(Klamath Falls Project) it was found by actual survey that over 12 percent of the stand or 1,200,000,000 B.F., had been killed during the past ten years. This volume of timber at $5.00 per M., which I believe is the present value, amounts to $6.000.000, or $600.000 per year. I will touch upon this project in more detail later.

Some ten years ago an outbreak of the mountain pine beetle occured within the boundaries of the Crater National Park. At the present time the infested area embraces some thirty square miles over which a large percent of the timber has been killed.

The valuable sugar pine stands of California are attacked by the mountain pine beetle. In this state of California the combined losses in Sugar pine and yellow pine during the season of 1922 amounted to 250.000.000 B.F. with an approximate stumpage value of $750,000.

In Arizona on the Kaibab Plateau, Kaibab National Forest, a severe epidemic of the Black Hills Beetle occured in 1919. Within the past five years approximately 300.000.000 B.F. of timber has been destroyed by this insect. Control measures were instituted in 1922 and again in 1923 with fair success. Funds were not available to treat more than 50 percent of the infested trees.

In addition to these barkbeetle epidemics which I have touched upon there are many others, secondary perhaps in importance, throughout our western forests. In nearly all mature pine forests there is a constant loss due to the attacks of barkbeetles, which varies from 1/10 to as much as 1/2 of 1 percent of the total volume of the stand. These infestations have become known as the normal infestation.

Forest tree defoliators which have always been regarded as the most important forest pest in the eastern United States, have in the past been viewed somewhat with indifference throughout the west. However in the past few years epidemics of defoliators have occured which has decidly changed this opinion.

In 1922 an outbreak of the Pine Butterfly occured in central Idaho, which continued for two years when the epidemic was reduced by natural enemies. However before this was brought about thousands of acres of high grade yellow pine were defoliated, and a large percent of these trees are now dying as a result of this injury.

During the same season the spruce budworm appeared in north Idaho. It was later found in the Yellowstone National Park, throughout the entire

timbered portion of Idaho, and I believe New Mexico. This is the first record that we have of this insect occuring in an epidemic form in the west, though in the North Woods of Maine and Canada millions of board feet of balsam and spruce have been killed by this insect since 1910. The future of this epidemic in the west is impossible to foresee, but we do know that in the Yellowstone National Park and Absaroka National Forest adjacent, and throughout the timbered portions of Idaho large areas of Douglas Fir, balsam and spruce have already been killed. Each season shows new regions infested and large volumes of timber killed.

During the past season outbreaks of a sawfly occured in the lodgepole pine stands of central Idaho and at West Yellowstone, Montana. At West Yellowstone this sawfly, which has not been determined, is working in association with another insect which is both a needle miner and tyer. These two insects make a real "Jack Sprat" combination, for the sawfly prefers the old foliage while the needle miner confines its activity entirely to the new, so betwixt the two they lick the tree clean. As a result of these combined attacks some twenty five square miles of lodgepole pine has been entirely destroyed, and the infested area is approximately one hundred miles square. During the past season the timber along the roadside extending through this area was sprayed for a distance of five miles into the park in order to protect the scenic values of this highway. This work was very successful, but will need be repeated for several years as reinfestation from the untreated regions adjacent is bound to occur. In central Idaho the sawfly epidemic is confined to a somewhat isolated patch

of lodgepole pine and it is trusted that there it will remain.

On the Klammath Indian Reservation there has been a serious epidemic of the Pandora moth for the past five or six years. Thousands of acres of yellow pine has been severely defoliated and a large percent of the injured trees are ~~are~~ dying. In some areas cruised it was found that as many as 1000 trees per section were dying, or had died as a result of this defoliation.

No doubt all of you know of the destruction of spruce and hemlock in Tillamook County, Oregon, by the Hemlock Looper, in 1919 and 1920. As far as I know there has been no recurrence of this epidemic.

In the Yosemite National Park, a needle miner has caused extensive damage by destroying the needles of lodgepole pine. The trees are not killed outright by this defoliation, but they are gradually weakened and become an easy prey to the attacks of barkbeetles. As early as 1898 this epidemic was recorded and to day some 30.000 acres of dead lodgepole pine stand as a monument to the powers of this insect.

I have tried to mention the most important forest insect epidemics which exist on the Pacific Coast at this time. There are however many other problems of forest entomology such as insect injury to forest products, relationship of logging slash to subsequent insect outbreaks, etc, that could not be included within the scope of this paper.

In closing I wish to touch very briefly upon the [illegible] Southern Oregon - Northern California Insect Control Project, which perhaps is

better known to you as the Klamath Fall Project. As many of you know this is the largest insect control project which has ever been undertaken. The area included within this project amounts to 1,200,000 acres, supporting a stand of over 12.000.000.000 B.F. The volume of timber killed during the past ten years, 1.200.000.00 B.F., has already been mentioned. The volume killed in ,

1920	--	123.000.000 B. F.
1921	--	119.000.000 B. F.
1922	--	104.000.000 B.F.
1923	--	75.000.000 B. F.

The volume killed in 1921, which is the year the control work started, represents an average annual loss for the past ten years. Following the institution of control measures the loss dropped to 75.000.000 B. F., showing a saving over the annual loss for the past ten years of 59.000.000 B. F. of timbered valued at $300.000. The cost of securing this reduction amounts to $93.000 which shows a net saving of $200,000. In view of this fact we feel that not only has the work been successful but it has paid its own way. The beetles have not been exterminated, nor do we ever expect to be able to do so, and unfortunately the past season has been a very favorable one for them, and they staged a very strong comeback, not only in the project but in all of the surrounding territory. However in the adjacent areas this increase of infestation has been far more severe than within the limits of the control project. Within the project units no increase above 30 percent is known, while in some of the adjacent areas the infestation has increased as much as 300 percent.

This situation is parallel with that of fire fighting, for the suppression of all fires within a forest during one season offers no assurance that there will be none the following year. Insect control can not be expected to eliminate the beetles no more than fire suppression tends to eliminate fires. If in any form of forest protection the work pays for itself from year to year, then it is justified.

With no thought of criticism whatever, I wish at this time to make a comparison between the fire and insect losses on the Klamath Falls area, in order to justify the rather heavy cost of the control work. Over a period of ten years the insect losses on this area have been fifty times more than the fire losses. Even during the past heavy fire season the insect damage was twenty-five time more than the fire. In view of this fact the cost of insect control which has average 7 cents per acre is not excessive when the fire suppression cost has been between 3 and 4 cents.

Please understand that we are not satisfied with the control measures which we are using at this time, for we feel that they can surely be improved upon, and perhaps disregarded entirely for some better means. This we hope will some day be brought about, but at the present time we are obliged to do the best we can with what we have, making some mistakes and some successes, in our effort to give the very best service possible. Our present methods are expensive, laborous, and uncertain. We know this, and know it far better than those who criticise us for using them, but likewise is the protection of our forests from fire and disease also expensive, laborous and uncertain.

The demands which have been made upon our limited personnel for examinations of infested timber and for control work have been so heavy during the past few years, that our investigative program has been sadly neglected. This is not at all to our liking, for the need for intensive research work on the problems of forest entomology in the United States is of very great importance of the pratice of forestry. Our methods of control of barkbeetle epidemics and for normal infestations need intensive study, and for our forest defoliators we can only hold up our hands. The study of forest entomology in the United States is in its infancy, and if we are to pratice forest conservation, these problems must be met and solved.